National Transportation Safety Board

Vehicle Factors

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Overview

- Condition of brakes
- Onboard brake stroke monitoring systems
- Vehicle weight
- Onboard vehicle weighing systems
- Lift axle air brake installation

Accident Truck

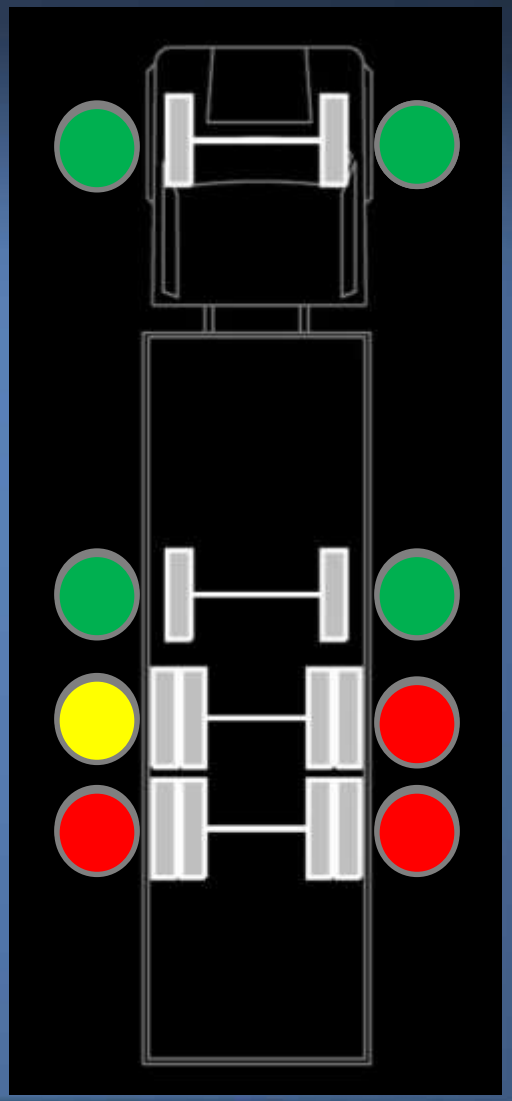
NTSB

Condition of Brakes

- Of 8 brakes in service:
  - 1 out-of-adjustment by $^{1}/_{4}$ inch
  - 2 at adjustment limit
  - 1 within $^{1}/_{8}$ inch of adjustment limit
- Approximate 17% reduction in braking efficiency
- Increased collision severity

Onboard Brake Stroke Monitoring Systems

- Previous recommendations to NHTSA
- Incorporate sensors into foundation brakes
- Driver interface

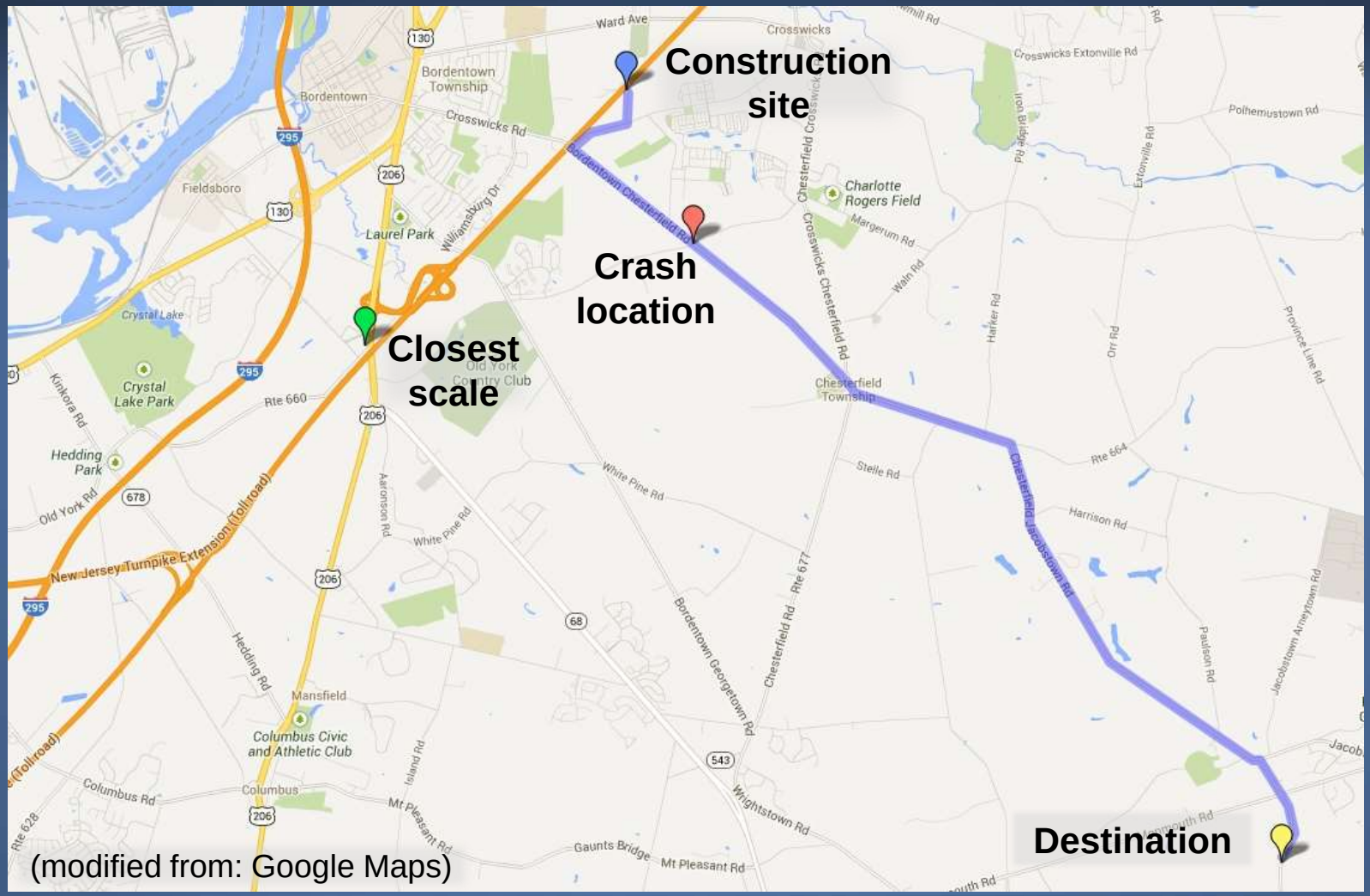


In adjustment

Within $^{1}/_{8}$ inch of adjustment limit

At or exceeding adjustment limit

Overweight Vehicle Route



(modified from: Google Maps)

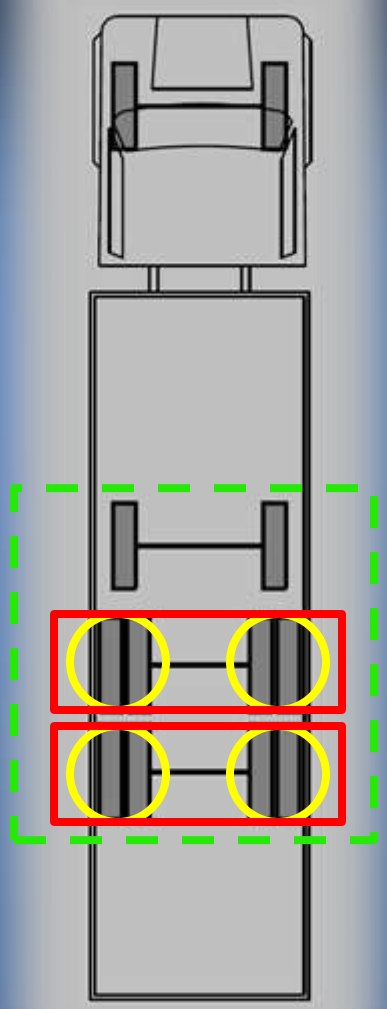
NTSB

Overweight Vehicle Route

- Driver required to use closest scale to pickup location
- Overweight citations issued as result of crash
- No policies, procedures, or driver oversight by company

Overweight Vehicle

- Gross vehicle weight: 84,950 pounds
- Approximate 9% reduction in braking efficiency



Axle weight (pounds)

15,100

12,800

29,000

28,050

69,850

Registered weight (80,000 pounds)

Tire weight ratings exceeded

Gross axle weight ratings exceeded

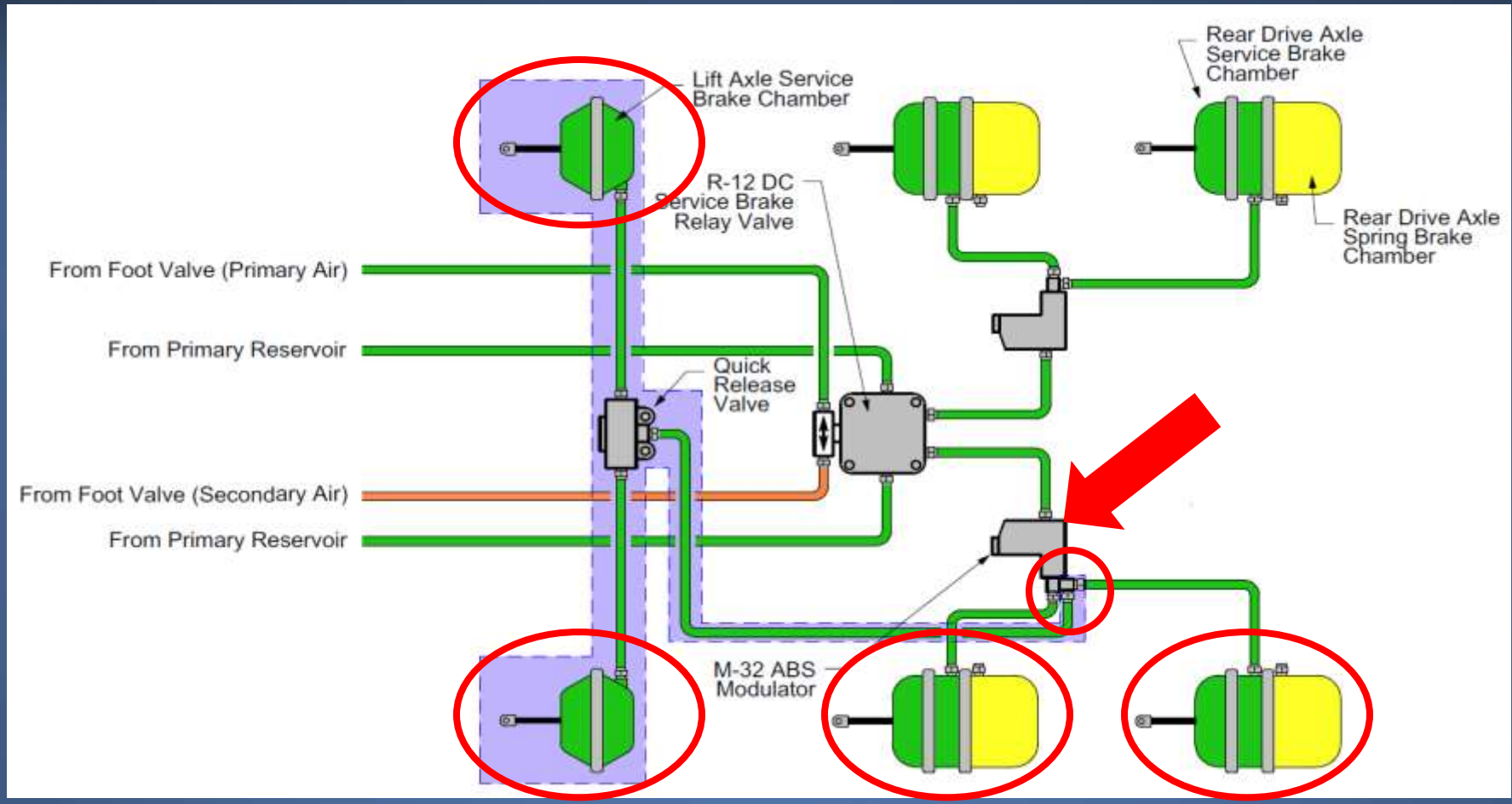
New Jersey axle group restriction (56,400 pounds)

NTSB

Onboard Vehicle Weighing Systems

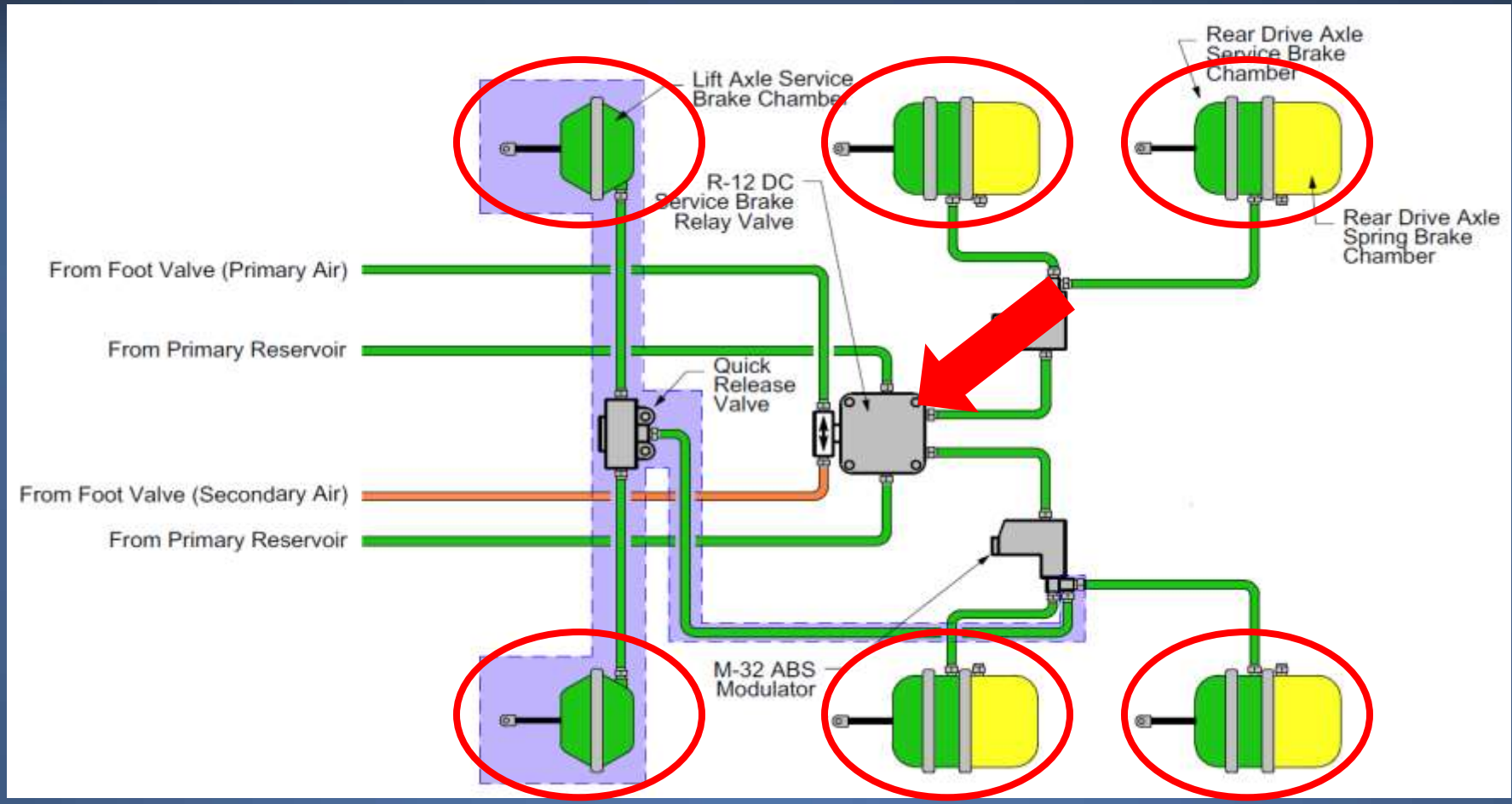
- Use load cells, air pressure transducers, or strain gages
- Driver interface
  - Provides axle weights, cargo weights, and/or gross vehicle weight
- ~ $2,000 – $7,500
- Original equipment or aftermarket

Lift Axle Brake Piping Installation



NTSB

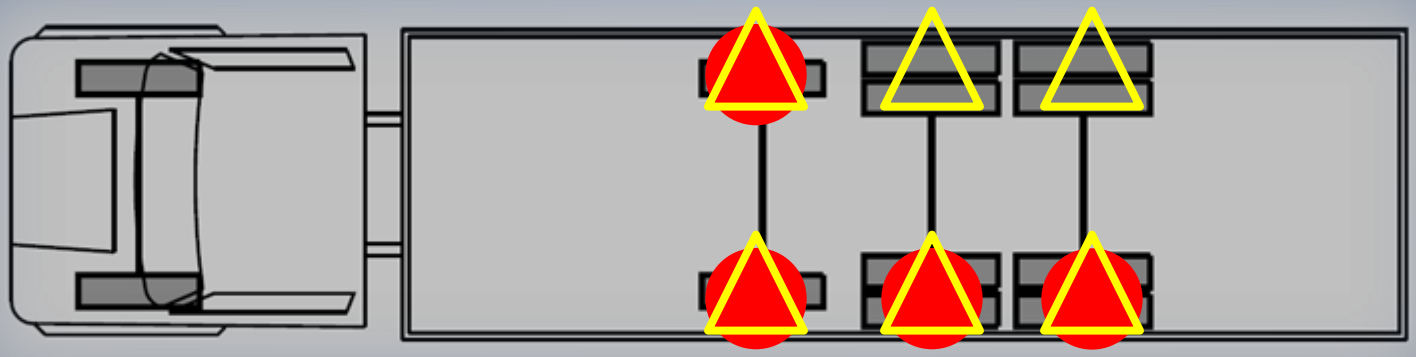
Lift Axle Brake Piping Installation



NTSB

Results of Improper Installation

- 2003 FMVSS 121 requirements:
  - Application (0-60 psi) within 0.45 second
  - Release (95-5 psi) within 0.55 second



Long application time

Long release time

Summary

- Braking efficiency degraded by
  - Brake defects
  - Vehicle weight
- Lack of route oversight for overweight vehicle
- Onboard brake stroke monitoring
- Onboard vehicle weighing systems
- Improper lift axle brake installation

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